

Electromagnetic Valve System

ABSTRACT

5 Systems are provided for electromagnetic actuation of a valve mechanism. A valve is linearly moveable between a first closed position and a second open position. A first spring is compressed when the valve is in the first closed position, and a second valve spring is compressed when the valve is in the second open position. An electromagnetic actuation assembly and a permanent magnet is combined with the valve, such that the valve is latchable in either a closed or open position, and is readily movable between positions through application of energy to the electromagnetic circuitry. The electromagnetic circuitry is controllable to increase or decrease the local magnetic flux, such as to promote movement of the valve, or to provide a soft landing of the valve at either end of movement. Some system embodiments provide energy recovery, feed back, and/or feed forward sensing and control. The electromagnetic valve system can be implemented for a wide variety of engines, valves and actuators, such as for variable valve timing, valve disablement, and/or hybrid engine and energy storage applications.